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THE RIGHT TO A HEALTHY ENVIRONMENT AT RISK: USE OF PESTICIDES IN BRAZILIAN CROPS, HIGH PRODUCTIVITY AND BEE EXTERMINATION

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ABSTRACT

The research developed here aims to analyze the legal and environmental effects resulting from the extermination of bees, the main natural pollinators, and the consequences within the scope of the fundamental right to a healthy environment. The study will focus on the main cause of this environmental imbalance in the context of the excessive or inappropriate use of pesticides in crops in several regions of the country, resulting from the excessive use of pesticides in Brazilian crops, putting at risk the right to a healthy environment. In this sense, the discussion about maintaining high productivity to meet the demand of the consumer market and the need to use various pesticides, even to the detriment of environmental balance, challenges the health authorities and the legal and scientific community, as it demands the formulation of measures that can minimize the effects and thus promote a balance between the two scenarios. The legal analysis will permeate, therefore, the problem of the challenges of maintaining a balanced environment and the frank Brazilian agricultural production, whose contribution follows world indices in the same activity and procedures. To conduct this research, the deductive method was used, qualitative research through bibliography composed of national doctrine, scientific articles on the subject and national legislation.

Keywords: Pesticides. Right to a balanced environment. Bee Extermination. Crops. Productivity.

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INTRODUCTION

There are biological agents and animals in nature that play a very important role in maintaining a balanced environment. It is not new that the fact that bees are being decimated by the indiscriminate use of pesticides has been discussed. Manifestations by beekeepers' associations have given signs that bee communities are directly affected by certain types of substances used in Brazilian crops.

Apart from the issues that affect the logistics of the activity, there are many transformations that have occurred in the environment regarding the proliferation of plant species, as is the case of pollen transport by bees. Not only that, they are also part of the food chain of other animal species, since fruits are the base of this chain.

This is not a new concern, but it is perennial given that little has been done to minimize the deleterious effects of the triggers that cause the extermination of bees. On the contrary, the measures have not been sufficient, since their advance is proportional to the necessary increase in crop productivity, a fact that has been much more privileged than the environmental balance in general.

In the scope of fundamental rights, there is a huge reflection, as it is not only a generic right to a healthy environment, as this condition also reflects the continuity of life. The maintenance of environmental balance calls for reflections in order to set goals to deconstruct the idea that there is conflict in relation to the fundamental right to food, which is linked to the cultivation of food on a large scale and the reduction of the indiscriminate use of pesticides.

The great truth surrounding this discussion is that it is not known for sure to what extent the interests of those involved in large agricultural businesses can influence the disclosure of the impacts caused by the use of pesticides. On the other hand, studies show that the harmful effects of these substances are increasingly present. This is the problem on which the research is based, around which comments and notes will be made.

The right to a healthy environment condenses all the inhabitants of the planet, and for this reason it is a global problem. The solution to restructure this dynamic, which is necessary for everyone, is to have a balance between activities, in order to avoid the disorder of the collapse of the colonies and agricultural production.

The research is based on the analysis of the assumptions of the authorizations for the use of pesticides harmful to bees and the compromise of the ecologically balanced environment. The deductive method was used, qualitative research based on bibliography

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composed of doctrine, national and foreign legislation and scientific articles on the subject. The positions of each of the stakeholders in the subject will be placed, as well as the opinions of the scientific community from various areas, in order to solve the problem and prevent the situation from causing an unprecedented environmental disaster.

THE ENVIRONMENT AS A THIRD-GENERATION FUNDAMENTAL RIGHT AND THE POSSIBILITY OF SUSTAINABLE DEVELOPMENT

The ascents achieved by the generations/dimensions of fundamental rights represent important achievements, which continue to undergo changes. Historically, Sarlet et al (2018, p. 329) comment that "since their recognition in the first constitutions, fundamental rights have undergone several transformations, both in terms of their content and in terms of their ownership, effectiveness and effectiveness [...]". This does not take away from humanity the right to develop, as long as it is sustainable, guaranteeing present and future generations the right to permanence and origin.

There is not specifically a differentiation between the denominations referring to generations and dimensions, but a complementation. This distinction between generations of fundamental rights "[...] is established only for the purpose of situating the different moments in which these groups of rights emerge as claims accepted by the legal order." (Mendes; Branco, 2021, p. 129). Any indication that these generations/dimensions have suffered succession is not consistent with the desire to conquer fundamental rights, which has the premise of adding values to these rights, and not eliminating them.

In other words:

> It should be borne in mind, however, that to speak of a succession of generations does not mean that the rights provided for at one moment have been supplanted by those that arose in the next. The rights of each generation remain valid together with the rights of the new generation, even if the meaning of each one is influenced by the juridical and social conceptions prevalent in the new moments.

Nevertheless, it is known that there is a certain disagreement among scholars about the correct nomenclature to designate the historical moment of conquest of fundamental rights related to the environment. It should be noted that Sarlet et al (2018, p. 330) points to the initiative for the division of generations/dimensions of fundamental rights:

> [...] with the aim of illustrating this process, the idea began to be disseminated – through the voice of Karel Vasak, from a conference given in 1979 at the International Institute of Human Rights, in Strasbourg – that the evolution of rights (human and fundamental) could be understood through the identification of three

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> "generations" of rights, with some arguing for the existence of a fourth and even a fifth and sixth generation of human rights and fundamental.

These generations/dimensions, when called the third evolutionary level, "[...] they are peculiar by their diffuse or collective ownership, since they are conceived for the protection not of man alone, but of collectivities, of groups" (Mendes; Branco, 2021, p. 129). The list comprises "[...] the right to peace, to development, to the quality of the environment, to the conservation of historical and cultural heritage." (Mendes; Branco, 2021, p. 129).

There is no doubt about the existence of the need to recognize the fundamentality of the right to a healthy environment, whether as a generation or as a dimension. As the years went by and the degradation of the planet was verified, the need for specific protection of the environment, to which all living beings belong and on which they are dependent, was seen. These third generation/dimension rights, as shown by Leite et al (2012, p. 58):

> It can be conceptualized as a process of transformation, in which the State, with its structures, and society begin to be influenced by ecological values, becoming aware of the situation of environmental crisis and providing itself with legal, institutional and social apparatuses, designed to ensure ecological balance as an essential requirement for a healthy quality of life.

The third generation/dimension, therefore, harbors the right to a healthy environment, in which it can be guaranteed, "[...] in fundamental aspects, the right to life, especially to a healthy quality of life, which provides the materialization of the structuring principle of the Brazilian legal system: the dignity of the human person." (Leite; Caetano, 2012, p. 58). That is why it is easy to agree that:

> [...] the right to an ecologically balanced environment, which is one of the main fundamental rights, based on the fact that it is only possible to achieve the rights of the first dimension (civil and political rights) and the second dimension (economic, social and cultural rights) with an ecologically balanced environment (third dimension). (Oliveira, 2017, p. 142).

As with the violation of other violations that affect the exercise of fundamental rights, there are also sanctions in return for the misuse of pesticides. Although the liability when it comes to pesticides is of a subjective nature, even so, the guiding function of fundamental rights, with regard to the injury to diffuse and collective rights, is in the maxim of the polluter-pays binomial.

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The implication of responsibilities related to the environment reaches multidisciplinary issues, as it involves not only legal aspects. Other sciences, such as agricultural and health, have been concerned about the situation, which has frequently worsened and affects several countries around the world. In vertical and horizontal relationships, in terms of responsibilities, food safety is one of the major global concerns, and for this reason, there is a certain tolerance regarding the use of pesticides in the way it has been done over the years.

It is precisely this dialectic between environmental balance and the maintenance of profits with the trade balance provided by agribusiness exports that causes most of the initiatives to contain the use of pesticides in crops to be delayed or even discarded.

Although there are several responsibilities tangential to the government, the setting of the parameters depends on the incidence of intent or fault, since it is up to the active subject the obligation of care in general, which includes, for example, from the purchase to the disposal of product packaging.

As much as the legislation may harden the possibilities of registering new pesticides, the arguments are not subsumed to the issue of the extermination of bees and the consequent environmental imbalance specifically. It is necessary to have a moderate study about what are, specifically, the toxic agents that cause the mass mortality of bees.

In this sense, it is important to analyze the legal context in which the environment is inserted in Brazil, aiming at its balance. The following topic will point out the main legal dictates and their developments.

LEGAL CONTEXT OF THE RIGHT TO A HEALTHY ENVIRONMENT IN BRAZIL

The Constitution of the Federative Republic of Brazil, in its article 225, provides that "everyone has the right to an ecologically balanced environment, [...], imposing on the Government and the community the duty to defend and preserve it for present and future generations." (BRAZIL, 1988). This determination imposes obligations on the government to take the necessary measures to curb any type of excess in the use of substances that may promote this imbalance.

However, in the history of Brazilian constitutionalism, this has not always been the case. Wolff (2000, p. 11) recalls that "the previous Constitutions dealt with the protection of the environment in an incident manner; most of the issues related to nature and natural resources - under the exclusive competence of the Union - reflected the issue from an

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economic perspective [...]" perhaps because at the time they were published, external agents and the pressure of consumer markets were not yet as exponent as they are now.

The above statement translates in another way, when analyzed from the perspective of the economic interests of the time, apart from environmental concern. In view of this, the texts of the previous Constitutions, according to Wolff (2000, p. 11):

> [...] could not contradict the reality of the development option of the Brazilian State, supported by the global orthodox model, little concerned with the conservation of the environment and strongly supported by the exploitation of raw materials, inadequate, therefore, to the fundamental protectionist (preservationist/conservationist) needs.

There are those who maintain that the world is experiencing a period of environmental crisis, and because of this, each State must equip itself with instruments that meet the conditions that, associatively, can be effective in preventing the advance of environmental degradation.

Some activities are more degrading to the environment, as is the case of pesticides, and there are discussions about their use in the sense that their effects do not produce the mortality of other living beings or the degradation of the environment with the alarming rates pointed out, as well as those that point out that they are the main culprits.

It is in the midst of this impasse that the environmental Rule of Law emerges, a democratic position that compels the State to position itself in the face of its obligation to protect the environment, as a fundamental right. This is because it is undeniable, currently, the complexity of the emerging environmental problems that demand that the State promote substantial changes in the structures of organized society, so that paths and alternatives are pointed out aiming at the preservation of environmental values.

While Leite et al (2012, p. 19) maintain that this scenario "[...] inevitably presupposes the adoption of a development model capable of considering future generations and the establishment of a policy based on the sustainable use of natural resources." The bases of this Environmental Rule of Law would be based on the application of the principle of environmental solidarity, since it is, essentially, a good of diffuse values not individually directed.

In the constitutional sphere, Fiorillo (2013, p. 145) states:

> By establishing the existence of a good that has two specific characteristics, namely, being essential to the healthy quality of life and common use of the people, the 1988 Constitution formulated a truly revolutionary innovation, in the sense of

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> creating a third type of good that, in view of its legal nature, is not to be confused with public goods and much less with private goods.

Although it is an issue in which everyone should be concerned, through the division of competences arising from the constitutional text, there is the incidence of the principle of the predominance of interests, and on it the prerogative to guide environmental legislation. However, some matters, including those related to environmental law, there are issues that go beyond local interest and make up a much broader theme.

The opportunity for the balance of the environment is provided for in article 225 of the Federal Constitution, but the interest is not restricted to it. In addition to the constitutional context, the infra-constitutional legislation is manifested in several norms that serve as vanguard instruments in the protection of forests and other forms of vegetation, as is the case of Law No. 4,771/65 (Forest Code), which contains this and other provisions.

The wake of the provisions of the aforementioned regulation includes the filling of gaps in the previous code in a more detailed way. Barros et al (2012, p. 159) comments:

> The legislator emphasized the establishment of protection areas within rural properties, such as the Permanent Preservation Area (APP) and Legal Reserve (RL), in addition to the regulation of the exploitation of forest products and the special treatment of family farming, considered environmentally and socially important for the country.

In general terms, this law, from the point of view of agribusiness representatives, is outdated, and does not represent the desires of the current moment experienced by large rural producers, making it appear that the problem is only in environmental legislation. One of the most combated points is the provision of legal reserve for all properties, considered a loss in view of the determination to maintain a preserved area.

From the evolution of the regulatory framework for pesticides, it is possible to observe that it is a coordinated set of corporate action strategies, whose actors are both the pesticide industries and those linked to the agricultural sector. Demands that meet their interests occupy a large part of the decision-making spaces of the public power.

However, even if barriers are imposed to contain the advance of product registrations that may bring harmful effects to the environment and to human beings, in particular, at the same time, these companies have enormous capacity to adapt to the criteria imposed and thus maintain the insertion of their products in the market, often propagating the "improvement" of it for environmental issues, without relating it to rational consumption.

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The common interest that Brazilian crops have productivity to meet the growing food demand is not denied. However, it is also known that the balance between the ways of using the environment is a more than necessary measure in the current scenario of environmental degradation. But the demand is not only for food, Brazil is also one of the countries with the highest level of pesticide use, along with the United States, China and Japan.

Wolff (2000, p. 12) points:

> By launching notions such as 'common interest' and 'harmful use of property' as well as 'rational use', 'precautionary norms' and 'forest education', this legal diploma attests to its capacity to adapt to the evolutions imposed by the imperative of sustainable development, where the protection of nature and natural resources, the promotion of economic development and the establishment of social justice must be closely associated.

However, this is still not a desirable scenario, taking into account that Brazil is also a country that has a much denser biodiversity than other countries and that this is where the Amazon rainforest is located, without detriment to other Brazilian biomes. Taking into account the specific conditions of each region, the constituent legislator allocated the competencies so that the environmental standards were concurrent and thus could better meet local desires.

Fiorillo (2013, p. 209) comments that the Brazilian constitution adopted "[...] the German system of division of competences, creating, for this purpose, the exclusive, the private with the possibility of delegation, those concurrent with the formation of general rules and the supplementary and residual rules of the States and Municipalities.".

The basis of this determination is the developmentalist option, which, along with the environmentalist option, has come to be valued and to take care of, among other issues, the control of impacts on nature and the use and conservation of natural resources (Wolff, 2000), as well as the humanist option, by intervening in favor of the reduction of social imbalances. Decentralisation was also carried out

Being, therefore, in the interest of the nation, based on the constitutional provision of article 23, VI and VII, Law No. 6,938/81, modified by Law No. 8,028/90, instituted the National Environmental Policy, whose intention was to "[...] to establish criteria for the protection of the environment adapted to the so-called common material competence, that is, environmental protection attached to norms that confer duties on the entities of the Federation and not simply faculties." (Fiorillo, 2013, p. 210).

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Despite this, agricultural spaces, due to the diversity of crops and cultivation conditions inherent to each Brazilian region, often ignore the general context, disregarding the environmental whole at risk. Newmann and Loch (2001, p. 244) observe:

> Every environmental problem has a high relationship with the particular ecological characteristics of the place where it occurs. Therefore, the proposed solutions should necessarily preserve the link with these particular ecological conditions. In fact, the rural is characterized precisely by presenting very distinct ecological spatial characteristics, and a given solution can present completely different results when these characteristics vary, which makes it impossible to propose standardized environmental solutions.

Notwithstanding the concern within environmental policy, proposals in the rural sphere must be in line with the terms of environmental policy, so that together they can find solutions to the environmental problem. Within the agricultural policy, article 3 of Law 8.171/91 establishes that one of its objectives is the protection of the environment and the guarantee of its rational use with a view to stimulating the recovery of natural resources, as a way of providing opportunities for the realization of the right to a balanced environment. (BRAZIL, 1991).

It is necessary to bear in mind that Brazilian environmental legislation is composed of standardized rules and regulations, affecting any and all scenarios in rural areas. This means that, regardless of the crop or the size of the cultivated area, many dictates are applied indistinctly, as it considers the initial premise that it is a homogeneous space.

Obviously this is a mistake, because even if they were similar spaces, in parallel, the same solutions could not be pointed out to them, because it lacks standardization of the elements that compose it. Neumann and Loch (2000, p. 244) adduce that the consequences of this issue can be analyzed "[...] under three aspects: the existence of very different ecological conditions; the polyfunctional characteristics of the rural; and the existence of a mosaic of agricultural production units that are very different from each other."

Therefore, since both policies have convergent objectives, the concern then becomes in relation to the effectiveness of the existing rules, which requires joint efforts to monitor compliance with them in agribusiness. The big issue, however, is not based on the existing legislation, but on the economic appeals that make the use of pesticides be considered a *sine qua non condition* for achieving economic efficiency in agribusiness.

The following topic proposes the analysis of the context of Brazilian crops, with regard to the challenge of high productivity and the maintenance of eco-environmental

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balance. The demand for high productivity challenges the increasing use of pesticides, which ends up putting at risk not only people's health but also the mortality of plants and animals.

BRAZILIAN CROPS: HIGH PRODUCTIVITY AND THE USE OF PESTICIDES

The cultivation of food to meet the needs of man emerged, in the context of the history of agriculture, with the domestication of plants and animals and the development and dissemination of techniques for their productive creation. But it was with the Green Revolution that a series of research, development, and technology transfer initiatives began, between the 1940s and the end of the 1970s.

Around 1975, with the creation of the National Program of Agricultural Pesticides, within the scope of the II National Development Plan, it provided financial resources for the creation of national companies and the installation of subsidiaries of transnational companies in the country, along with the possibility of obtaining credit to fund the creation of a large-scale demand for inputs for agriculture, made possible by the creation of the National Rural Credit System in 1965. (Pelaez; Earth; Silva, 2010, p. 28).

This was the reaction of the rural producer market to the population increase, which encouraged the development of techniques for food production in order to meet the growing demand. However, no thought was given to the side effects that the use of pesticides could cause to the environment, including human beings. Today it is known that the effects of the poisons used at the beginning of the insertion of pesticides can take years to manifest, and that they depend on the quantity, degree of exposure and the beings with which they have contact.

The historical context in which pesticides were inserted in Brazil reflects the *modus operandi* and the deleterious effects resulting from them, and are part of the main arguments of environmentalists and health experts for the formulation of strict rules for authorization of use in Brazil. Lucchesi (2005, p. 04) narrates the mild way in which they were handled at the beginning of their use by farmers:

> In Brazil, the introduction of phosphorus insecticides to replace DDT was accompanied by a cruel method. To prepare DDT, which was formulated as a soluble powder, farmers were taught to use their arm, with their hands open, turning half a turn in one direction and the other to dissolve the foot. As DDT has a high lethal dose, that is, it requires a high absorption of the product to cause death, only 15 years later health problems appeared. However, when the farmer tried to repeat the technique with Parathion, the first phosphorus introduced in Brazil, he dropped

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> dead, fulminating in a few hours. This fact was repeated in several regions of the country.

Through this finding, and with the increase in the risks of human activities, the public power "[...] was forced to expand the legal discipline on environmental protection, as well as its institutional role, creating mechanisms for risk assessment, aiming to subsidize decision-making processes, in order to avoid the occurrence of environmental damage." (Barros et al, 2012, p. 157). Thus, the institution of the National Environmental Policy provided the definition of tools in the environmental field that aim to contain economic activities that threaten the environment. The containment provides for preventive and restraining measures, so that there can be more control in activities that challenge the maintenance of environmental balance.

The use of pesticides in Brazil is regulated by Law No. 7,802/89, ranging from the handling of the product, its application and the correct disposal of the packaging. There is also the possibility of "[...] intervention of International Organizations operating in the areas of health, food and environment, in order to issue warnings about the risk inherent in the use of pesticides [...]" (Silva, 2019, p. 11).

Over time, it was possible to verify that, as much as it represented advances, especially with regard to actions related to the granting of registrations, there were still gaps that, during the process of adaptation to the new legislation, demonstrated that they were not sufficient to avoid possible harmful effects of pesticides on the environment and human health. This law was not able to solve or at least mitigate the controversial points regarding the evaluation parameters and the attribution of inspection by the public power. (Pelaez; Earth; Silva, 2010, p. 37).

Regarding the chapters that deal with the competencies and registration of pesticides, Pelaez, Terra and Silva (2010, p. 37) comment:

> [...] the new regulatory framework established in the hands of the Executive Branch the prescription of the official parameters that should be met for the evaluations that would grant registration. The parameters would be created from ministerial decrees. [...] This discretionary space for the exercise of Executive Power has become the focus of action for interest groups represented by class associations from different segments of the pesticide industry such as Andef, Aenda and Sindag and part of the agricultural sector, through the National Confederation of Agriculture (CNA).

There is a healthy logic in the dynamics that involve the conflict of interests between subjects in the relationship with pesticides and the environment. This means, according to the conclusions of Pelaez, Terra and Silva (2010, p. 47) that, "[...] At the same time, the

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logic of short-term private interests conflicts with a long-term priority and greater public interest, based on the defense of human health and the environment."

It should be noted that "the expected action of the pesticide occurs due to the presence in its composition of an active ingredient that affects the normal biological activity of living beings sensitive to it." (Pelaez; Earth; Silva, 2010, p. 30). Bees suffer this aggression, and that is why there is a mass devastation of these insects that only tends to intensify, since the increase in both the quantity and diversity of toxic products tends to intensify only not only in Brazil, but in a global context.

There is evidence that:

> [...] The excessive use of fertilizers can cause acidification in soils, contamination of water reservoirs and eutrophication (excess nutrients in the water that causes the exaggerated growth of organisms such as algae). But it can also cause damage to the environment and put at risk the health of the population that consumes products with excess pesticides. Pesticides, as can be seen, can be used as a defoliant, desiccant, stimulant and growth inhibitor. (Pereira et al, 2019, p. 32)

Over the years, the Organization for Economic Cooperation and Development (OECD) has found it difficult to obtain accurate information about the use of pesticides by countries and the environmental impact caused by them. Brazil is not a member of the OECD, but, according to the Ministry of Foreign Affairs, Brazil has participated, as a guest, participant or associate (BRASIL, MRE, 2018).

Responsible for the toxicological evaluations of pesticides in Brazil, the National Health Surveillance Agency (ANVISA) is responsible for regulating, analyzing, controlling and inspecting the use of pesticides in the country. The registration is done by the Ministry of Agriculture, Livestock and Supply (MAPA). The competencies are listed in Decree No. 4,074/2002, which provides for several types of pesticide registrations.

According to data collected on the ANVISA website (2019), "pesticides, components and the like have an indefinite validity, and may be canceled in cases of toxicological reassessment, impossibility of remedying identified irregularities or when fraud is found.".

It is worth mentioning that the agribusiness sector imposes strong pressure on governments, because, according to Fávero (2008, p. 12):

> In addition to representing itself as a conscious producer that collaborates with environmental preservation, agribusiness invokes another characteristic, which would be even more important: it is the productive sector that contributes the most, in Brazil, to sustaining the development of the economy and the well-being of the population.

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In the midst of the producers' protests, the most publicized arguments are in the sense that "[...] Environmental preservation has a very large cost and, according to the agribusiness discourse, has been paid exclusively by farmers, which ends up making the sector itself unviable." (Fávero, 2008, p. 12). The main argument is that the mandatory installation of the Legal Reserve, which can reach up to 50% of the property (including what was destined for the riparian forest), renders a piece of the property useless and makes production unfeasible.

Bill 4146 of 2019 is being processed by the National Congress, which proposes:

> It introduces, in the pesticide law, concepts related to new product, equivalent product (generic) and risk assessment, in order to remedy dissonant interpretations of the rule. It regulates the risk assessment procedure, which comprises four stages: 1) hazard identification; 2) hazard characterization (including dose-response assessment); 3) exposure assessment; and 4) characterization of the risk. Finally, it deals with the registration of pesticides, their components and the like. (BRAZIL, 2019).

In addition, it is very unlikely that there will be a retreat in the authorization of pesticides and consequently the recognition that these substances cause a serious environmental imbalance, caused by the death of bees. As protagonists of pollination, these insects tend to suffer strongly from exposure to these substances, as well as from the devastation of forests, compromising pollen and nectar stocks.

THE EXTERMINATION OF BEES AND THE RISK TO THE ENVIRONMENT

The work of bees in the environment stands out for its pollinating action and plant reproduction, elements of fundamental importance for terrestrial ecosystems, also including agriculture. The expansion of large-scale and intensive agriculture has been responsible for the disappearance of biodiversity in the world, as they occupy large areas and promote the deforestation of forests and their replacement by crops.

This is also a reality experienced in Brazilian agribusiness, which intensively practices the planting of certain crops, with the massive use of pesticides, which, in the medium and long term, may compromise food production and the performance of the agricultural sector itself. The Food and Agriculture Organization of the United Nations (FAO) released a report of the study that broadly evaluated the relationship between the variety of living organisms in the world and food production. (UN, FAO, 2019).

According to data collected on the FAO website (UN, 2019):

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> FAO also analyzes the state of associated biodiversity, that is, species of living beings that do not reach the consumer's table, but that provide essential services for food and agriculture — the so-called ecosystem services. This is the case, for example, of pollinators, which are part of the ecological balance behind the reproduction of plant species. Bees, butterflies, bats, and wild birds are some examples of pollinators.

Beringer (2019, p. 17) comments that most angiosperms need the pollination process to develop fruits and seeds, and thus, "the main and most efficient pollinators are bees, but these are suffering an increasing population decline, due to various factors and causing numerous consequences.". This reality is not typically Brazilian, it has been observed for more than 10 years in several countries around the world.

There is not just one certain cause of the abrupt disappearance of bees. Bizawu and Lemgruber (2018, p. 110) adduce that "the causes can be divided into four general categories: pathogenesis, parasites, mechanical and management stress mechanisms, and environmental stress mechanisms", among which "[...] environmental management and stressors can be better mitigated by legal norms and protection and regulatory measures" (Bizawu; Lemgruber, 2018, p. 110).

There is a huge risk that the number of dead insects will gradually grow and with that, end up depleting the species. The FAO report (UN, 2019) points out that in Brazil, of the "[...] Of 1,173 species of fauna classified as endangered, 188 can be considered pollinators. Among them are 85 varieties of birds, 63 species of butterflies and moths, 29 of beetles, seven of bats and four of bees."

Agribusiness's bet on pesticides is based on the possibility of reducing production losses and increasing the resulting profit. Veiga (2007, p. 147) explains that "pesticides are compounds that have a wide variety of chemical substances or biological products and that were developed in order to enhance a biocidal action, that is, they are developed to kill, exterminate and combat agricultural pests."

For this reason, they are extremely lethal to living organisms, as they can be absorbed dermally, inhaled by the lungs or ingested in contaminated products. (Veiga, 2007, p. 147). The way in which its harmful potential will be measured will depend on "[...] of its chemical characteristics, of the amount absorbed or ingested, of the time of exposure and of the general health conditions of the contaminated person."

Malaspina et al (2008, p. 42) comment that "in addition to the effects of acute toxicity leading to the death of bees, insecticides can also cause behavioral changes in individuals, which over time will cause serious damage to the maintenance of the colony." This implies

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that when the insecticide does not cause the death of bees, it can trigger effects that prevent them from carrying out the work of pollination and honey production, depending on the species.

Thus, toxic products such as "fipronil, commercially known as Regent, is a phenylpyrazole insecticide introduced in pest control, but which affects other non-target insects, causing their mortality." (Malaspina, 2008, p. 42). Bees' main source of food is nectar, transformed into honey, and pollen, which is fermented by microorganisms present in the digestive tract of bees. (Pires et al, 2016). Pires et al (2016, p. 428) explain, in addition:

> These foods have a very large nutritional variation, which occurs according to the botanical species from which they are obtained, and provide all the essential nutrients. The deficiency of any of these nutrients can impair the development, maintenance and reproduction of colonies, reduce the life of bees, cause stress and facilitate the appearance of diseases.

Although it were possible to develop alternative mechanisms so that these bees could not be affected by the action of pesticides, the demand for more precise research, which can determine the nutritional requirements of bees, is not easy to be carried out, because each caste has its own needs. (Pires et al, 2016, p. 428). This is because nutritional requirements are different between offspring and adults according to age, function of adults in the colony, time of year and metabolic rate, as pointed out by Pires et al (2016).

With a view to finding alternatives to contain this scenario, FAO (UN, 2019) concluded:

> Among these strategies are organic farming practices, integrated pest management, conservation agriculture, sustainable soil and forest management, combining agriculture with forestry, diversification practices in aquaculture, fisheries and ecosystem restoration.

However, it is necessary to recognize that "as long as public policies are not instituted that aim to contribute to broader evaluations of beekeeping health, in the national territory, both by regulatory bodies of animal health [...]". (Pires, 2016, p. 437). These initiatives within the scope of the public power do not inhibit the private initiative, equally interested in the maintenance of bee communities and their important role as pollinators.

Thus, "the creation of a national fund fostered by the private sector, but managed by public research agencies, can be a way out for financing studies aimed at evaluating the

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effect of active ingredients, under field and semi-field conditions [...]", as pointed out by Pires et al, 2016, p. 438).

It is necessary to understand that there is a constitutional commitment to this and future generations. Preserving the environment implies the preservation of human life, which depends completely on it to survive. Degrading the environment demonstrates an ambiguous activity, and not preserving it, contradictory.

Exercising the right to enjoy natural wealth does not give man the right to destroy it, with the vain idea that everything will be renewed, sooner or later, given that most resources are not renewed, such as the large number of animal species that have already been extinct.

CONCLUSION

In view of what has been seen, the problem of bee mortality is a global problem, and tends to be accentuated by the expansion of crops, the deforestation of forest areas and the use of pesticides. Brazil has agencies responsible for the authorization, research, and control of pesticides, as well as relevant legislation. But what is observed is that there is not the necessary effectiveness to ward off the excesses and contaminations that so harm and unbalance the ecosystem.

The pressure exerted by companies that own large agricultural enterprises means that the condition of authorization and use of pesticides suffers many interventions. Concerns in the context of the environment and with living beings in general end up being relativized, either because of the absence of conclusive research in this regard, or because they are considered to be inevitable and avoidable effects in the concrete case.

It is evident that this is not an avoidable condition, considering that many of these effects can be devastating and cannot even be mitigated. The issue of bee mortality is of punctual relevance in this context, as they are animals that play a fundamental role in the multiplication of plant species, including the crops that use pesticides, through pollination.

Despite the many forms of contamination caused to bee communities, the fact that they visit these crops and end up being contaminated implies that all the subjects involved must take action, given the importance of these insects for the environment. What we saw was that the problem is not only the sensitivity of bees to toxic products, but the harmful potential that they end up having to a whole chain of animals involved in the process.

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It was possible, in view of the analyses, to find suggestions to minimize the effects of these pesticides, and thus try to protect the environment from the natural wear and tear of the massive use of pesticides and animals, such as bees, from being exterminated from the planet. One of them is that the Brazilian government is more receptive to international examples, and that it takes into account the experience lived by other countries with regard to, at least, research to protect bees and other living beings involved.

This is not a problem to be fought in Brazil, several countries suffer from the concern of maintaining the necessary productivity to meet the growing consumer markets and the protection of the environment. The use of pesticides to control pests that affect crops, especially in countries with a predominantly tropical climate such as Brazil, is of fundamental importance so that there are no incalculable losses.

However, Brazil's participation as a member of international organizations would be interesting, at least to develop more effective mechanisms to contain the environmental devastation caused by the use of pesticides. The discussion of the topic could help in how to intensify inspections with polluting agents, the biomes involved, have more criteria to authorize the use of pesticides, as well as develop research in order to minimize the harmful effects of these agents on the environment. Not least, it is essential that these poisons have a more specific action on each type of crop, and that their effects do not affect species other than those that are intended to be fought.

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